Claims:

1. Information carrier, comprising at least two solid material interfaces at which information is or may be applied and whereat the information is stored by local modulation of at least one solid material characteristic, from which characteristic reflection of electromagnetic radiation depends at said interfaces, further comprising at least one intermediate layer between said two solid material interfaces, which layer transmitting said radiation, said intermediate layer comprising a layer at least predominantly consisting of at least one of Si_xC_y and of Si_vN_w.

2. Information carrier, comprising at least two solid material interfaces at which information is or may be applied and whereat the information is stored by local modulation of at least one solid material characteristic, from which characteristic reflection of electromagnetic radiation depends at said interfaces, further comprising at least one intermediate layer between said two solid material interfaces, which layer transmitting said radiation, said information being readable from at least one of said solid material interfaces by means of radiation of predetermined wavelength, wherein said intermediate layer comprises a dielectric layer system with at least one layer, said layer system having an optical thickness which, at least in a first approximation, is $m \cdot \lambda_o/4$, wherein m is integer, at least unity and is uneven and wherein λ_o designates the wavelength of said radiation which is transmitted through said at least one dielectric layer of said dielectric layer system, wherein, departing from said m being integer, m may be reduced by an amount of up to 0,6 or increased by an amount of up to 0,2.

3. The information carrier according to claim 2, wherein

said dielectric layer system at least predominantly consists of at least one of Si_xC_y and of Si_vN_w.

4. The information carrier according to one of the claims 1 to 3, wherein said locally modulated characteristic is the thickness of a solid material body defining at least one of said solid material interfaces.

5. The information carrier according to one of the claims 1 to 3, wherein electromagnetic radiation for at least one of applying said information and of reading said information has a wavelength within the wavelength band of

$$400\text{nm} \leq \lambda_s \leq 800\text{nm}.$$

6. The information carrier according to claim 5, wherein said band is

$$630\text{nm} \leq \lambda_s \leq 655\text{nm},$$

especially

$$633\text{nm} \leq \lambda_s \leq 650\text{nm}.$$

7. The information carrier according to one of the claims 1 to 3, wherein reflection at at least one of said solid material interfaces is 20% to 40% (both limits included) for a predetermined wavelength of said radiation.

8. The information carrier according to claim 7, wherein said predetermined wavelength is within at least one of the

$$400\text{nm} \leq \lambda_s \leq 800\text{nm} \text{ band and of the}$$

$$630\text{nm} \leq \lambda_s \leq 655\text{nm} \text{ band,}$$

especially

$$633\text{nm} \leq \lambda_s \leq 650\text{nm}.$$

9. The information carrier according to claim 7, said reflection being valid for a first wavelength at a first of said solid material interfaces and for a second wavelength at the second solid material interface, reflection of radiation of said second wavelength at said first solid material interface being significantly lower than of radiation of said first wavelength.

10. The information carrier according to claim 9, said first wavelength being approximately 635nm or approximately 650nm.

11. The information carrier according to claim 9, wherein said intermediate layer comprises at least one dielectric layer having an optical thickness which is an at least approximately uneven multiple of a quarter of one of said first and second wavelengths and is at least approximately an even multiple of a quarter of the other of said first and second wavelengths.

12. The information carrier according to claim 9, wherein said second wavelength is approximately 785nm.

13. The information carrier according to claim 9, wherein said reflection of said radiation at said second wavelength and at said first solid material interface is 10% at most.

14. The information carrier according to one of the claims 1 to 3, wherein at least one is valid:

a) the index of refraction n_1 of said intermediate layer is:

$$2,59 \leq n_1 \leq 4,6.$$

b) the extinction coefficient k of said intermediate layer is at least one of:

	$k_{300nm} \leq 3,0;$
especially	$k_{300nm} \leq 1,5$, and
especially of	$k_{350nm} \leq 2,7$,
and of	$k_{600\text{-}700nm} \leq 0,5$.

15. The information carrier according to one of the claims 1 to 3, wherein said intermediate layer comprises a spacer layer.

16. The information carrier according to claim 15, wherein said spacer layer consists of at least one of a lacquer and of a glue.

17. The information carrier according to claim 2 or 3, wherein said dielectric layer consists ~~at least~~ predominantly of at least one of the materials of the group ZrN, HfN, TiN.

18. The information carrier according to claim 17, wherein said dielectric layer at least predominantly consists of ZrN.

19. The information carrier according to one of the claims 1 to 3, wherein one of said solid material interfaces is formed between said intermediate layer and a plastic material or between said intermediate layer and a spacer layer or between said intermediate layer and a high reflecting cover layer.

20. The information carrier according to claim 19, wherein at least one of the following is valid:

- said plastic material is one of polycarbonate and of PMMA,

- said spacer layer is at least predominantly of at least one of lacquer and glue,

- said high reflecting cover layer is at least predominantly of at least one of Al, Au, Ag.

21. The information carrier according to claim 20, said high reflecting cover layer consisting at least predominantly of Al.

22. The information carrier according to one of the claims 1 to 3, wherein one of said solid material interfaces is formed at a lacquer surface.

23. The information carrier according to claim 22, wherein said lacquer is hardenable by means of ultra-violet radiation.

24. The information carrier according to one of the claims 1 to 3, wherein said intermediate layer comprises at least one semiconductor doping material.

25. The information carrier according to claim 24, wherein said doping material is at least one of Boron and Phosphor.

26. The information carrier according to one of the claims 1 to 3, wherein said intermediate layer comprises C and forms at least one of said solid material interfaces with a further material which contains C as well.

27. The information carrier according to one of the claims 1 to 3, wherein radiation in the blue spectral range of 400nm $\leq \lambda_s \leq$ 500nm performs at least one of reading and writing of said information.

28. The information carrier according to one of the claims 1 to 3, wherein said intermediate layer comprises at least one of Si_xC_y and of $Si_xC_yH_z$, wherein $x \geq y$.

29. The information carrier according to one of the claims 1 to 3, wherein said intermediate layer comprises at least one of Si_vN_w and $Si_vN_wH_u$, wherein $v \geq w$.

30. The information carrier according to one of the claims 1 to 3, wherein said intermediate layer comprises at least one of Si_xC_y and $Si_xC_yH_z$ and wherein $x \geq 1{,}2y$.

31. The information carrier according to claim 30, wherein $x \geq 2y$.

32. The information carrier according to one of the claims 1 to 3, wherein said intermediate layer comprises at least one of Si_vN_w and of $Si_vN_wH_u$ and wherein $v \geq 1{,}2w$.

33. The information carrier according to claim 32, wherein $v \geq 1{,}6w$.

34. The information carrier according to one of the claims 1 to 3, wherein said intermediate layer comprises $Si_xC_yH_z$ and wherein there is valid:

$$x \leq 0{,}8,\ y \geq 0{,}05 \text{ and } z \geq 0{,}1.$$

35. The information carrier according to claim 34, wherein there is valid:

$$x \leq 0{,}52,$$
$$y \geq 0{,}1,$$
$$z \geq 0{,}2.$$

36. The information carrier according to one of the claims 1 to 3, wherein said intermediate layer comprises at least one of $Si_vN_wH_u$ and Si_vN_w and wherein there is valid:

$$v \leq 0,8,$$
$$w \geq 0,05.$$

37. The information carrier according to claim 36, wherein there is valid:

$$w \geq 0,1.$$

38. The information carrier according to one of the claims 1 to 3, wherein said intermediate layer comprises at least one of Si_xC_y and $Si_xC_yH_z$ and wherein there is valid:

$$\{0,445 : 0,262\} \leq \{x : y\} \leq \{0,775 : 0,078\}.$$

39. The information carrier according to one of the claims 1 to 3, wherein said intermediate layer comprises at least one of Si_xC_y and $Si_xC_yH_z$ and wherein there is valid:

$$\{0,445 : 0,249\} \leq \{x : z\} \leq \{0,775 : 0,118\}.$$

40. The information carrier according to one of the claims 1 to 3, wherein said intermediate layer comprises at least one of Si_xC_y and $Si_xC_yH_z$ and wherein there is valid:

$$\{0,078 : 0,249\} \leq \{y : z\} \leq \{0,262 : 0,118\}.$$

41. The information carrier according to one of the claims 1 to 3, wherein said intermediate layer at least predominantly consists of $Si_xC_yH_z$ and wherein there is valid:

$$x:y:z = 0{,}704\ (\pm\ 10\%)\ :\ 0{,}087\ (\pm\ 10\%)\ :\ 0{,}131\ (\pm\ 10\%),$$

wherein ± 10% indicates the statistic dispersion of multiple measurements of the values.

42. The information carrier according to one of the claims 1 to 3, wherein said intermediate layer at least predominantly consists of $Si_xC_yH_z$ and wherein there is valid:

$$x:y:z = 0{,}494\ (\pm\ 10\%)\ :\ 0{,}238\ (\pm\ 10\%)\ :\ 0{,}226\ (\pm\ 10\%),$$

wherein ± 10% indicates the statistic dispersion of multiple measurements of said values.

43. The information carrier according to one of the claims 1 to 3, wherein said intermediate layer comprises at least one of Si_vN_w and $Si_wN_wH_u$ and wherein there is valid:

$$\{0{,}527\ :\ 0{,}401\} \leq \{v\ :\ w\} \leq \{0{,}858\ :\ 0{,}099\}.$$

44. The information carrier according to one of the claims 1 to 3, wherein said intermediate layer comprises at least one of Si_vN_w and $Si_vN_wH_u$ and wherein there is valid:

$$\{0{,}527\ :\ 0{,}044\} \leq \{v\ :\ u\} \leq \{0{,}858\ :\ 0{,}009\}.$$

45. The information carrier according to one of the claims 1 to 3, wherein said intermediate layer comprises at least one of Si_vN_w and $Si_vN_wH_u$ and wherein there is valid:

$$\{0{,}099\ :\ 0{,}044\} \leq \{v\ :\ u\} \leq \{0{,}401\ :\ 0{,}009\}.$$

46. The information carrier according to one of the claims 1 to 3, wherein said intermediate layer comprises at least one

of Si_vN_w and $Si_vN_wH_u$ and wherein there is valid:

$$v : w = 0{,}78\ (\pm\ 10\%) : 0{,}11\ (\pm\ 10\%),$$

wherein $\pm$ 10% indicates statistic dispersion of multiple measurements.

47. The information carrier according to one of the claims 1 to 3, wherein said intermediate layer comprises at least one of Si_vN_w and $Si_vN_wH_u$ and wherein there is valid:

$$v : w = 0{,}586\ (\pm\ 10\%) : 0{,}364\ (\pm\ 10\%),$$

wherein $\pm$ 10% indicates statistic dispersion of multiple measurements.

48. The information carrier according to one of the claims 1 to 3, wherein adherence of said intermediate layer on an adjacent solid material of the carrier withstands at least one of the tests according to MIL-M-13508C and of MIL-C-00675B as defined in H. Pulker, "Coatings on Glass", Elsevier, 1984, p. 358.

49. The information carrier according to one of the claims 1 to 3, wherein at least three of said solid material interfaces are provided on one side of a carrier substrate.

50. The information carrier according to one of the claims 1 to 3, with an information storage capacity per side of a carrier substrate of at least 11GByte at a diameter of a circular carrier of 120mm.

51. The information carrier according to claim 50, said storage capacity being 13GByte.

52. A method for producing a layer at least predominantly consisting of at least one of Si_xC_y and of Si_vN_w by means of a reactive vacuum coating process, comprising the step of freeing Si from a solid body into the process atmosphere, reacting said freed Si in the process atmosphere with a reactive gas containing at least one of C and N.

53. A method for producing a layer at least predominantly consisting of at least one of $Si_xC_yH_z$ and of $Si_vN_wH_u$ by means of a reactive vacuum coating process, wherein an optimum of transmission of said layer and of refractive index of the material of said layer is achieved by means of adjusting the concentration of a gas in the process atmosphere, which gas comprises at least two of C, N and H.

A 54. The method according to claim ~~53~~ 77, wherein Si is freed into the process atmosphere from a solid body.

B

A 55. The method according to ~~one of the~~ claims ~~52 to 54~~ 76 ~~77~~, wherein said gas in said process atmosphere at least predominantly consists of two different gases with different ratios of at least one of C content to H content and of N content to H content and wherein said optimum is one of open-loop- and of negative-feedback-controlled by adjusting the ratio of amount of said two gases in said process atmosphere.

112

A 56. The method according to ~~one of the~~ claims ~~52 to 54~~ 76 or 77, further comprising applying between a carrier for workpieces, whereon said layer is produced, and an electrode in a vacuum atmosphere a DC-voltage and superimposing to said DC-voltage an AC-voltage.

57. The method according to claim 56, wherein said AC-voltage superimposed to said DC-voltage is a pulsating voltage.

58. The method according to claim 56, wherein said AC-voltage is generated by intermittently connecting said carrier and said electrode via a first current path and a second current path, which second current path having a considerably lower resistance than said first current path.

A 59. The method according to ~~one of the~~ claims ~~55 to 57~~ 76 or 77, comprising one of reactive sputtering and of ion plating for said reactive vacuum coating.

60. The method according to claim 59, wherein said sputtering is performed by magnetron sputtering.

A 61. The method according to ~~one of the~~ claims ~~52 to 57~~ 76 or 77, wherein a target of negative or positive doped silicon is one of reactively sputtered, ion plated and reactive magnetron sputtered.

A 62. The method according to ~~one of the~~ claims ~~52 to 54~~ 76 or 77, further comprising the step of feeding a reactive gas with at least one of hydrocarbon and of hydronitrogen to said process atmosphere.

63. The method according to claim 62, wherein said reactive gas is at least one of the group of Propane, Butane, Methane and Ammonia.

64. The method according to claim 62, wherein said reactive gas is at least one of Propane and Nitrogen. 112

A 65. The method according to ~~one of the~~ claims ~~52 to 54~~ 76 or 77, wherein said layer is produced as a layer of an intermediate layer between two solid material interfaces of an information carrier, at which interfaces information is or may be

applied, and whereat the information is stored by local modulation of at least one solid material characteristic, from which characteristic reflection of electromagnetic radiation depends at said interfaces.

A 66. The method according to ~~one of the~~ claims 76 or 77 ~~52 to 54~~, wherein said layer is produced at an information carrier as an intermediate layer between two solid material interfaces, which intermediate layer comprises a dielectric layer system with at least one layer, at which interfaces information is or may be applied and whereat the information is stored by local modulation of at least one solid material characteristic, from which characteristic reflection of electromagnetic radiation depends at said interfaces, wherein said layer system has an optical thickness which, at least in a first approximation, is $m \cdot \lambda_o/4$, wherein m is integer and at least unity and is uneven and wherein λ_o designates the wavelength of said radiation which is transmitted through said at least one dielectric layer of said dielectric layer system.

67. An apparatus for producing a layer at least predominantly of one of Si_xC_y, $Si_xC_yH_z$, Si_vN_w, $Si_vN_wH_u$, comprising a vacuum recipient with a workpiece carrier electrode therein and a solid body material source, which frees silicon into said vacuum recipient, and further comprising a gas inlet which is connected to a gas reservoir with a gas containing at least one of C and N.

A 68. The apparatus according to claim 78 ~~67,~~ wherein said gas inlet is connected with at least two gas reservoirs, wherein gases are contained with different ratios of at least one of C to H and N to H content.

A 69. The apparatus according to ~~one of the~~ claims 78 ~~67 or 68,~~

~~wherein~~ said workpiece carrier electrode and a further electrode in said vacuum recipient are interconnected via a DC-voltage source and a superposition unit, an AC-source being connected to said superposition unit.

70. The apparatus according to claim 69, wherein said AC-source generates a pulsating voltage superimposed to DC-voltage of said DC-voltage source at said superposition unit.

A 71. The apparatus according to ~~one of the~~ claim~~s~~ 78 ~~67 or 68~~, wherein said workpiece carrier electrode and a further electrode in said vacuum recipient are interconnected via a DC-voltage source and a chopper unit connected parallel to said DC-source and parallel to said workpiece carrier electrode and further electrode, said chopper unit intermittently connecting said workpiece carrier electrode and said further electrode high ohmically and lower ohmically.

A 72. The apparatus according to ~~one of the~~ claim~~s~~ 78 ~~67 or 68~~ being a sputtering apparatus.

A 73. The apparatus according to ~~one of the~~ claim~~s~~ 78 ~~67 or 68~~ being an ion plating apparatus.

74. A target for vacuum coating process, consisting of negatively or positively doped silicon.

75. The target according to claim 74 being doped with at least one of Boron and Phosphor.

ADD A4
ADD A5
ADD A6

Add B3

add C1